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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER

SAKELARIS, SALLY A

ART UNIT	PAPER NUMBER
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1773

NOTIFICATION DATE	DELIVERY MODE
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05/04/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
efiling@kmob.com
eOAPilot@kmob.com

Office Action Summary	Application No. 10/583,640	Applicant(s) KEERSMAECKER ET AL.	
	Examiner SALLY A. SAKELARIS	Art Unit 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-24,26-32,41 and 50-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-24,26-32,41 and 50-62 is/are rejected.
- 7) ☒ Claim(s) 52-62 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/28/2011 has been entered.

Claim Objections

Claims 52-62 are objected to because of the following informalities: There are 2 claim 52s. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 51-59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 51 recites that the “field effect transistor” is “attached upside down to a solid substrate by a bottom auxiliary layer”. It is not clear if the applicant is intending to claim that the included circuit is to be built upside-down (i.e. the positive rail is ground), if the solid substrate is right side up or upside down, or if the FET is right side up or upside down. Furthermore the term

Art Unit: 1773

"upside down" and "backside" are relative terms depending on one's vantage point. The applicant should clarify the objective positively recited structure of this device. It is presently unclear.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1773

1. Claims 21-32, 41, and 50-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yousaf et al.(PNAS, 2001) in view of Hollis et al. (US 5653,939)

With regard to claim 21, Yousaf et al. teach a sensing device for sensing a specific binding between an analyte and a recognition molecule, the sensing device comprising: a patterned, localized, and individually addressable microelectronic sensor comprising an individually addressable activation element and a plurality of self-aligned recognition molecules (i.e., the monolayer is interpreted as being self-aligned, localized, and individually addressable in the absence of any structural requirements for these components see Figure 1) micro-electronically addressable sensor surface, the sensor surface comprising a recognition molecule (self-assembled monolayer (SAM) of alkanethiolates) and an activation element (i.e., electrical potential) which is a thermal or electrochemical activation element, wherein the activation element is configured to activate the sensor surface by heating or adjusting an oxidation state of a part of the anchoring layer through an applied voltage or current, wherein the recognition molecule (i.e., monolayer featured in Figure 2) is covalently bound to the sensor surface (i.e., Au and Sulfur of the monolayer), and wherein the sensor is capable of electrochemically detecting a specific binding between the recognition molecules and an analyte as can be seen in the electrochemical teachings on page 5993 (1st ¶ and Rt column 2nd ¶).

With regard to claim 22, Yousaf et al. teach that a cyclic voltammetry was performed with a Bio-analytical Systems (CV-50 potentiostat by using the gold/SAM as the working electrode, platinum wire as the counter electrode, and Ag/AgCl as the reference electrode (Materials and Methods, Electrochemistry, Pg.5993).

Art Unit: 1773

With regard to claims 23 and 24, Yousaf et al. teach that each of the plurality of patterned, localized micro-electronically addressable sensors are individually activatable and addressable (i.e., via application of electrical potential and subsequent Diels Alder mediated immobilization of peptide on right of Figure 2 and Figure 1 for teaching of patterned and localized).

With regard to claims 25 and 26, Yousaf et al. teach that the sensor surface includes a chemical molecule based, SAM anchoring layer (Figure 2) covalently bonded to the gold substrate.

With regard to claim 27, Yousaf et al. teach that the SAM anchoring layer is activatable via an application of an electrical potential of 500mV (figure 2).

With regard to claims 28 and 29, Yousaf et al. teach that the electric potential based activation element converts the once inert monolayer (SAM) to a monolayer presenting the corresponding quinine groups which ultimately results in their Diels-Alder mediated immobilization of peptides (Furthest right in Figure 2).

With regard to claim 30, Yousaf et al. teach that the material is gold which is a transition metal.

With regard to claims 31 and 32, Yousaf et al. teach that the thermal activation element is a potentiostat (CV-50) which includes a resistor.

With regard to claim 41, Yousaf et al. teach that their device is a microelectronic chip considering it operates using micro-scaled features that rely on electronic conductance (Fig.1).

With regard to claim 50, Yousaf et al. teach a method for electrochemically detecting (Page 5993 1st ¶ and Rt column 2nd ¶), a binding event, the method comprising: providing a

Art Unit: 1773

sensing device according to claim 21 as can be seen above, activating the sensor surface; depositing a recognition molecule from a liquid phase or a vapor phase onto the sensor surface (see above rejection for claims 21-32); and detecting a binding event between the recognition molecule and an analyte (i.e., detection was measured by scanning electron micrograph and via fluorescence microscopy (Figures 3-5 page 5995)).

With regard to claims 21 and 50-59 in light of the above indefiniteness issue, Yousaf et al. does not teach that the part of the anchoring layer that is either heated or cooled or the exact size of this area.

Hollis et al. teaches the use of embedded resistors (32) described in connection with FIGS. 1 and 4 to locally heat predetermined array test sites without substantially heating adjacent sites (Col. 13 lines 50-60). Furthermore, Hollis et al. teaches that about 7+million test sites can be fabricated and tested on a single 3 in. Silicon wafer using the state of technology at the time when this patent was issued.

At the time the invention was made it would have been obvious to a person of skill in the art to have incorporated the regions and heaters sized as taught by Hollis et al. into the device of Yousaf et al. as the ability to affect multiple changes in the bioactivity of a substrate will be especially useful in studies of heterotypic cell-cell interactions where the fate of a given cell depends on the identities and periods of exposure to neighboring cells. Such dynamic substrate would also prove useful in microfluidic lab-on-a-chip systems by allowing active use of channels to process analytes in a sample. In addition Hollis provides that the heating of each selected region results in the ability to deprotect (revealing free -OH groups) at selected locations making the addition of nucleic acid bases a more specific venture (Col. 12).

Art Unit: 1773

2. Claims 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yousaf et al.(PNAS, 2001) in view Hollis et al. (US 5653939) and in further view of Shin et al. (Applied Surface Science 214(2003) 214-221).

The teachings of Yousaf in view of Hollis et al. can be seen above.

With respect to claim 63, Yousaf et al. teach the use of hydroquinone-terminated alkanethiol (HQ) and penta (ethylene glycol) terminated alkanethiol (EG5OH) to install the electroactive monolayer in the nonprinted regions.

Yousaf in view of Hollis et al. do not teach an ISFET or the use of Ta2O5.

Shin et al. teach tantalum pentoxide for use as the pH sensitive layer for ISFET (Introduction page 214).

It would have been obvious to a person of skill in the art at the time the invention was made to have include the ISFET and Ta2O5 of Shin into the device of Yousaf in view of Hollis as Shin teaches that Ta2O5 shows the best pH sensitive properties in terms of sensitivity and stability making it a superior choice for cost, efficiency and resource savings. Furthermore, it is well known that it is obvious to combine prior art elements according to known methods to yield predictable results.

Response to Arguments

Applicant's arguments with respect to claims 21-32 have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 1773

In the interest of compact prosecution, the applicant is encourage to include positively recited structural limitations of their sensor, its structural constitution comprised by various elements and recitations of the proximity and position of each of these elements to one another in order to obviate the presently cited art. The applicant is encouraged to phone the examiner with their ideas should they desire feedback before their submission.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sally A. Sakelaris whose telephone number is 5712726297. The examiner can normally be reached on Monday-Friday 8-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 5712721267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sally A Sakelaris/

Examiner, Art Unit 1773

4/26/2011